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- (57) Claim

1. Apparatus for separating an initial flow of contaminated rainwater from rainwater flowing from a collection area to a storage or usage area, said apparatus comprising a T-piece with associated rainwater fall pipe, which T-piece is adapted for connection in the rainwater flow path to intercept the flow of rainwater flowing into a downpipe or directly to a storage or usage area; said fall pipe including a float which seals on a seat when the fall pipe is at least partly full of water, an outlet which limits the rate of flow from the fall pipe in comparison with the rate of maximum flow of rainwater which can enter the fall pipe by way of the T-piece connection, and means enabling solid contaminants to be removed from the fall pipe.

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**COMPLETE SPECIFICATION  
FOR A STANDARD PATENT**

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The following statement is a full description of this invention,  
including the best method of performing it known to us

## A FLUID DIVERTER

### BACKGROUND OF THE INVENTION

This invention relates to rainwater collection systems and in particular to apparatus for separating an  
5 initial flow of contaminated rainwater from rainwater flowing from a collection area to a storage or usage area.

In water collection systems such as the collection of rainwater from the roof of a domestic building, it is desirable to divert any initial flow of  
10 water away from reservoirs or tanks in which the water is collected. This is because the roof and guttering can collect animal or bird droppings, or dust, grit and other airborne material all of which are flushed from the roof and guttering with the initial flow of water.

15 Diverters have been developed for installation in water collection systems. In the main, known diverters tend to have a myriad of springs, flaps and valves that invariably fail to operate, waste large quantities of water or require setting of components for proper operation.  
20 Some diverters result in the loss of as much as 50 litres of water and have continual water loss which can result in most if not all water being diverted to waste in light rainfall conditions.

Most known diverters for rainwater collection  
25 systems fit into a stormwater pipe at a tank inlet between a building and the tank and are usually large and not suitable for use with under-eaves tanks which are in wide use today. Other known diverters can become infested with vermin and insect pests such as mosquitos, wasps and  
30 spiders. Such infestation can cause the diverter to malfunction and/or contaminate the collected water.

### OBJECT OF THE INVENTION

It is an object of the present invention to provide a liquid diverter which overcomes or at least  
35 minimises the disadvantages of existing liquid diverters used in water collection systems, and/or provides the public with a useful alternative.

### SUMMARY OF THE INVENTION

According to the present invention there is provided an apparatus for separating an initial flow of contaminated rainwater from rainwater flowing from a collection area to a storage or usage area, said apparatus comprising a T-piece with associated rainwater fall pipe, which T-piece is adapted for connection in the rainwater flow path to intercept the flow of rainwater flowing into a downpipe or directly to a storage or usage area; said fall pipe including a float which seals on a seat when the fall pipe is at least partly full of water, an outlet which limits the rate of flow from the fall pipe in comparison with the rate of maximum flow of rainwater which can enter the fall pipe by way of the T-piece connection, and means enabling solid contaminants to be removed from the fall pipe.

#### DESCRIPTION OF THE INVENTION

The principle of operation of the apparatus is that an initial volume of contaminated rainwater flows into the fall pipe and causes the float to move against its seat and seal the fall pipe so that further rainwater by-passes the fall pipe. The contaminated rainwater is released from the fall pipe at a restricted flow rate. Preferably, the rate of release is regulated by such means as a valve fitted to the base of the rainwater fall pipe or by means of a barrier of permeable material. The regulation may, however, be by means of a device located away from the fall pipe in which case a conduit is provided in fluid communication between the fall pipe and the device.

The rainwater fall pipe is typically a conventional cylindrical downpipe with a right angular T-piece fitted to its upper end and a cap fitted on the lower end thereof. Preferably the cap is screwed onto the cylindrical chamber and has an internal elastomeric seal to ensure a fluid tight seal between the fall pipe and the cap. Alternatively, the opening can have a valve included therein which can be opened to allow efflux of fluid from the chamber.

The float can be any shape provided that the

shape affords closure of the fall pipe when lifted by the water. Typically the float is a ball float which is free to move longitudinally within the fall pipe.

5 The volume of the fall pipe of the various embodiments of the invention can be varied to adjust the amount of fluid diverted into the fall pipe. This amount will depend upon the type of system in which the fall pipe is used.

10 The fall pipe can be fabricated from polyvinylchloride or the like which is typically used in plumbing installations. The float can similarly be formed from any suitable impervious material provided that the density of the material is less than the density of water.

15 So that the invention can be better understood, an example of separating apparatus will now be described with reference to the accompanying drawings.

#### DESCRIPTION OF THE DRAWINGS

20 Figure 1 is a plan view of a water collection system including a diverter according to the invention with some parts of the figure in cross section; and

Figure 2 is a cross-sectional view of a portion of the diverter chamber shown in Figure 1 which provides detail of the outlet for the means for regulable release of water from the chamber.

#### 25 DESCRIPTION OF PREFERRED EMBODIMENT

In all the drawings like reference numerals refer to like parts.

30 The apparatus to be now described is suitable for installation in a system for collecting rainwater from a house roof. Referring to Figure 1 there is shown apparatus 1 included in piping 2 and 2a connecting a gutter 3 to a water storage tank (not shown). The apparatus comprises cylindrical fall pipe 4, float 5 and T-piece 6 which includes inlet 7 and outlet 8. T-piece 6 also includes a  
35 circular seat 9 for float 5. The lower end of fall pipe 4 has fitted thereto a screw cap 10 which can be removed to allow efflux of water and/or other material from the chamber. Cap 10 also includes a nipple 11 which is

connected to a drip irrigator 12 by flexible tubing 13.

A portion of fall pipe 4 can be seen in Figure 2 together with cap 10, nipple 11 and flexible tubing 13. It can be seen from this figure that cap 10 seals chamber 4 by attachment to a sleeve 14 fitted over the end of the piping making up the chamber. Figure 2 also shows that larger debris and insects are prevented from entering nipple 11 by screens 15 and 16 associated therewith.

As to material making up the diverter, the piping of fall pipe 4 is 90 mm PVC. Screen 15 is 6 mm plastic coated wire mesh while screen 16 is 0.9 mm stainless steel mesh. Other components are PVC or other plastics material and all components are readily available from commercial sources.

It can be appreciated from Figure 1 that water entering gutter 3 flows through piping 2 and inlet 3 to enter fall pipe 4. As the fall pipe fills, float 5 is lifted upward on the surface of the water and contacts seat 9 to prevent further passage of water into the fall pipe. Water can then flow directly from inlet 7 to outlet 8 and then to a tank via piping 2a. Any material flushed from the roof and gutter in the initial flow will be collected in fall pipe 4 and can be cleared from the diverter by removing cap 10.

The drip irrigator 12 allows slow release of water accumulated in fall pipe 4. Larger debris which may have entered the chamber is prevented from entering nipple 11 by screen 15 (Figure 2). Screen 16 filters out smaller matter such as insects from water entering the nipple and irrigator 12.

The nature and number of irrigators connected to nipple 11 determines the rate of flow of water from the chamber. Since roofing and guttering on a building need only be flushed every 24 hours, the rate of flow of water from the fall pipe is advantageously adjusted to empty the fall pipe within 24 hours so that the efficiency of the apparatus is not compromised.

The amount of water held in fall pipe 4 can be

adjusted by varying the fall pipe volume. This can be effected by increasing the length of the piping making up the fall pipe and/or using piping of a different diameter. Using piping of 90, 150, 225 or 300 mm diameter, fall pipe  
5 volumes of 5 to 100 litres can be obtained.

Tests were conducted to optimise the dimensions of the apparatus exemplified above for use in a domestic water collection system. In a typical house, there is an average of one downpipe per 50 to 70 m<sup>2</sup> of roof area.  
10 Testing was carried out using 70 m<sup>2</sup> of roof area directed through a single gutter outlet to the apparatus. To simulate bird and animal droppings, plastic beads and styrene shapes of equivalent density were used.

Eight consecutive tests were carried out and the  
15 results indicated that between 7 and 8 litres of water were required to flush the roof area and gutter. From these tests, it was calculated that for an apparatus having a 90 mm diameter fall pipe, a fall pipe length of 1,400 mm is required for optimal results.

20 In the foregoing tests, the float was found to retain the contaminated water in the fall pipe of the apparatus and prevented the contaminated water from percolating into the flow of water from the apparatus outlet.

25 The irrigator used in the example described above has outlet apertures which prevent entry of insects. With appropriate measures to prevent entry of insects at other openings into the water system, pest contamination of the collected water is avoided.

30 The exemplified apparatus will aid in the removal of larger debris such as leaves and twigs from the water system. However, it will be appreciated that the system preferably includes a debris trap upstream of the diverter.

It will also be appreciated that many changes and  
35 modifications can be made to the device exemplified above without departing from the broad ambit and scope of the invention.

## THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Apparatus for separating an initial flow of contaminated rainwater from rainwater flowing from a collection area to a storage or usage area, said apparatus comprising a T-piece with associated rainwater fall pipe, which T-piece is adapted for connection in the rainwater flow path to intercept the flow of rainwater flowing into a downpipe or directly to a storage or usage area; said fall pipe including a float which seals on a seat when the fall pipe is at least partly full of water, an outlet which limits the rate of flow from the fall pipe in comparison with the rate of maximum flow of rainwater which can enter the fall pipe by way of the T-piece connection, and means enabling solid contaminants to be removed from the fall pipe.

2. Apparatus as claimed in claim 1 and wherein the flow of rainwater from the outlet is regulated.

3. Apparatus as claimed in claim 2, wherein the flow of rainwater from the outlet is regulated by a valve fitted to the base region of the rainwater fall pipe.

4. Apparatus as claimed in claim 1, wherein the flow of rainwater from the outlet is limited by means of a barrier of permeable material.

5. Apparatus as claimed in any one of the preceding claims and wherein a screen is provided within the fall pipe for trapping the solid contaminants.

6. Apparatus as claimed in claim 5 and including a removable cap on the bottom of the fall pipe to enable access to the screen so that the accumulated solid contaminants can be removed.

7. Apparatus as claimed in any one of the preceding



claims wherein the float is a ball which is free to move longitudinally within the fall pipe.

8. Apparatus as claimed in any one of the preceding claims wherein the seat is located in or adjacent to the T-piece.

9. Apparatus as claimed in any one of the preceding claims wherein the T-piece is a right-angular T-piece.

10. Apparatus for removing solid contaminants from rainwater flowing from a collection area to a storage or usage area substantially as herein described with reference to the accompanying drawings.

DATED this 1st day of May 1998

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By his Patent Attorneys

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ABSTRACT

Apparatus for use in domestic rainwater collection systems for separating contaminated water in the initial flow. The apparatus comprises a T-piece and fall pipe. The initial flow of water enters the fall pipe which then seals to enable continued flow of the rainwater straight to storage. The contaminated rainwater is bled from the fall pipe over a period of time. Filters can be provided in the fall pipe for solid contaminants.

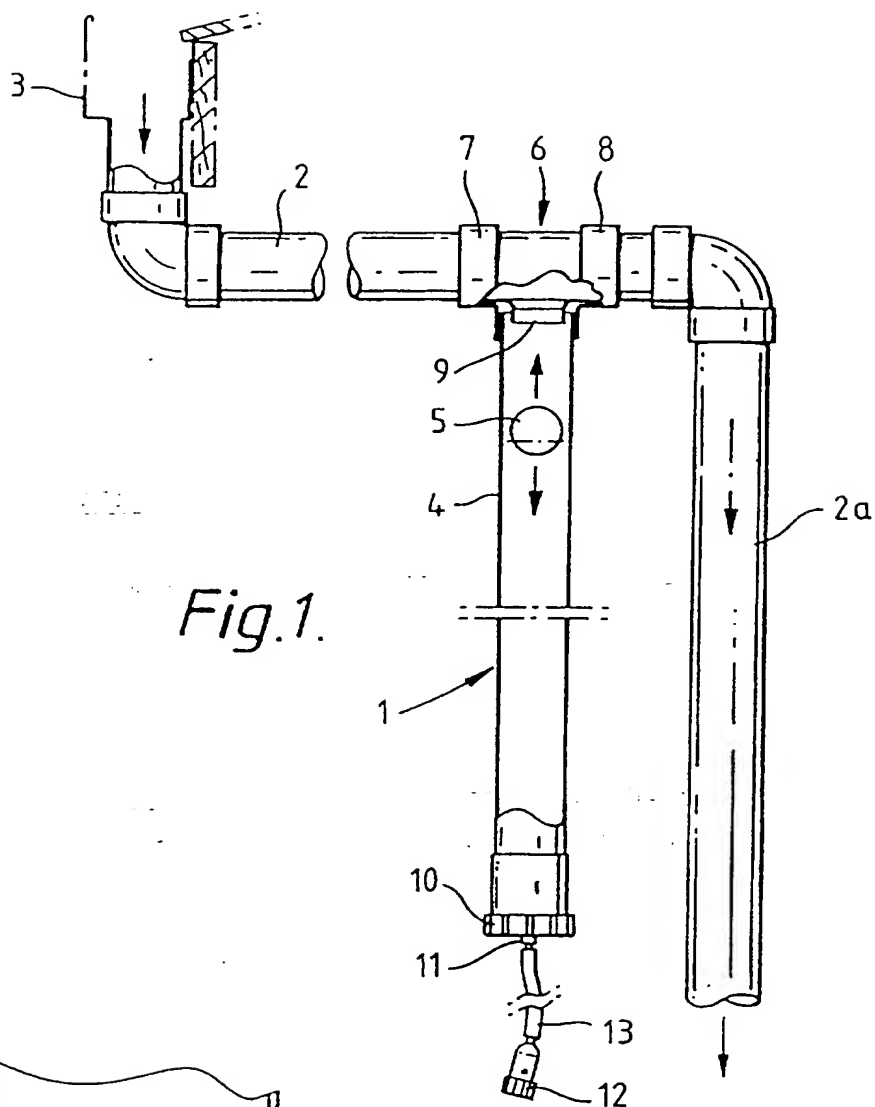
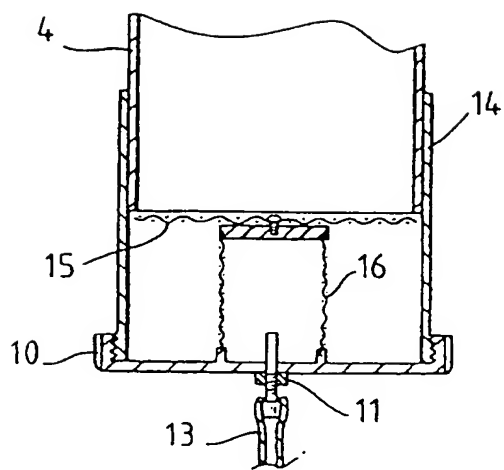


Fig.1.



*Fig. 2.*